The Effects of Exercise on Depression in College Students

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A thesis submitted in partial fulfillment

of the requirements for the degree of

Masters of Science in Nursing

The University of Michigan –Flint

March 27, 2007

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Chapter I

Introduction

Depression affects over nineteen million adults annually, including college students. At colleges nationwide, studies have shown large percentages of students are feeling overwhelmed, sad, hopeless, and so depressed that they are unable to function (NMHA 2004). In a recent national college health survey, one in seven students were diagnosed with depression. Thirty percent were freshman who were overwhelmed a great deal of the time during the beginning of college, and thirteen percent were women. Anxiety and depression are leading concerns of college students' mental health. Attending classes, taking tests, writing papers, and doing homework can overwhelm students who have busy schedules, are working, or nurturing children. These and other life concerns can create considerable stress, decrease sleeping hours, lower attendance rates, and cause a student to drop out. Emotional behaviors, such as alcohol and drug use can impede their success in college. Suicide is the third leading cause of death for those ages fifteen to twenty-four, and the second leading killer in the college population (Gangi 2004).

Six to eight percent of all out patients in primary care settings suffer from major depression. According to the National Ambulatory Medical Care survey in 1998, more than seven million primary care visits were made annually in the 1990's for the treatment of depression. Despite these large numbers of patients diagnosed as having depression, the disease remains under diagnosed, and only one third of those are receiving treatment from a clinician. (Artel, 1999). Thus, depression is an important problem for nurse practitioners who provide health care to college students in the primary care setting.

Research on physical activity and depression goes back to the nineteenth century. In recent decades, many studies have documented the benefits of exercise on the mood and health of clinically depressed individuals. How exercise alleviates depression remains unclear. Psychological and physiologic effects have been suggested. Ninety percent of the studies reported show both acute and chronic exercise are related to a large reduction in depression. Exercise provides an outlet for releasing negative emotion, such as anger, frustration, and irritability. By stimulating the production of neuro-chemicals in the brain, such as nor epinephrine, it improves a depressive mood (Artel, 1999).

In a landmark study by Griest and associates, at the University of Wisconsin, exercise was found to be helpful for people with more moderate forms of depression. They assigned a small group of 24 clinic patients with moderate depression to either an exercise program or one of two widely used forms of treatment. In the two standard treatment groups, therapists met with the patients once a week; in the exercise group, patients went jogging with a trainer three times a week for 45 to 60 minutes at a time. After 12 weeks, about three-quarters of the patients in each of the three treatment groups had lessened their depression. But one year later, the people who had been treated with running therapy were still running on their own and were free of depression, while half of those who received psychotherapy had returned for treatment (Grist, 1997). Exercise was shown to be at least as effective as more traditional therapies in this study. In the next chapter, the theoretical framework for using exercise in the treatment of depression will be discussed. The Health Promotion Model by Pender (2002) will be examined in relation to exercise as a treatment for depression.

Chapter II

Framework

The Health Promotion Model by Nola Pender

Increasing healthy behaviors and decreasing risky or health damaging behaviors of persons in today's society are a challenge for health professionals. Nola Pender's (2002) Health Promotion Model (HPM) focuses on explaining health promoting behaviors, using a wellness orientation. According to the model, health promotion entails activities directed toward developing resources that maintain or enhance a person's well-being.

The HPM classifies health behavior determinants into three specific propositional groupings: a) individual characteristics and experiences, b) behavior specific cognitions and affects, c) situational / interpersonal influences. The individual demographic characteristics and experiences are innate factors, and in this study include (gender, age, race), as well as experience factors that influence future behavior. These background factors are largely un-modifiable. The behavior-specific cognitions and affect category includes perceived benefits-barriers to behavior, perceived self-efficacy, and affect cues to behavior. These factors are the target of most of the HPM research to date. The situational and interpersonal influences affects, in my study include such situations as history of depression, and situational / interpersonal influences such as marital, and educational status.

Pender's Health Promotion Model is useful in research of college age students at UM- Flint. As the subject presents to the student center for treatment, the transition process of personal responsibility for health behavior begins. The nature of human

agency, or the ability to control life events, is explained as a triadic relationship between behavior, interpersonal factors (cognitive, affective, biologic) and external factors such as modifying ones diet as suggested in the handout Food for the Mood (see Appendix A), and links to the importance of health.

Evidence from multiple research studies indicates that exercise can be useful in treating and avoiding depressive illnesses. There is sufficient evidence too, that exercise can improve mood, and that people who are more active are much more likely to rate themselves, and their sense of mental well-being more positively. In addition, regular exercise appears to offer a vehicle for change through improvements in the way one views their physical self. Exercise has a potential to improve self esteem and identity change as a behavioral out come in Pender's Model (Pender 2002).

Exercise cultivates self esteem and self efficacy in a number of ways including; a) whenever an individual participates in a health enhancing activity it is common to experience increased feelings of self worth as one realizes they are doing something which will ultimately benefit them, b) participation in physical activities that have known social value attached to them, promotes social acceptance and status, c) an added benefit of regular physical activity is that it has the potential to alter one's body image in a socially desirable manner thus increasing self image and improving self esteem, d) frequent physical activity also promotes physical challenges and when conquered, foster feelings of self efficacy (Artel 1999).

Exercise offers opportunities for social support. Recreational activities such as golf, a

fun run, or basketball, encourages a sense of fun and play with other individuals that have similar interests, and can provide an opportunity to discuss life situations. The sharing ensues one that they are not alone and that help is available (Pollock 2001).

Chapter III

Review of Literature

Depression Definition and Signs and Symptoms

A Healthy People 2010 goal is to improve mental health and ensure access to appropriate, quality mental health services. Their definition of mental health is "a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and to cope with adversity." This definition contrasts what The United States Department of Health and Human Services describes that, "depression, a mental disorder, is a health condition that clouds one's thinking, mood or behavior, or combination of these. This may impair functioning, and cause more problems that might include disability, pain or death" (U.S. Department of Health and Human Services 2000).

The most widely used definition of depression is from the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, 2000). The essential feature of a depressive episode is a period of at least two weeks during which there is either depressed mood or the loss of interest or pleasure in nearly all activities. In children and adolescents, the mood may be irritable rather than sad. One may also experience at least four additional symptoms drawn from a list that includes; changes in appetite, weight loss or gain, changes in sleep and psychomotor activity; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating or making a decision, and recurrent thoughts of death or suicide plans or attempts. To count toward a major depressive episode, a symptom must be either newly present or must have worsened compared to a person's prior episode status.

The symptoms must persist for most of the day, every day, for two consecutive weeks. The episode must be accompanied by clinical distress or social impairment, occupational, or other important areas of functioning. This functioning may appear to be normal but requires markedly increased effort.

The signs and symptoms of depression will be discussed next. The American Psychiatric Association (2000) describes the mood in a depressive episode by the person as sad, depressed, hopeless, discouraged, or "down in the dumps." In some people sadness may be denied at first, but then later be elicited by interview or by pointing out the persons appearance of looking as if he or she is about to cry. In some individuals who complain of feeling bad, having no feelings, or feeling anxious, the presence of a depressed mood can be inferred from the person's facial expression and demeanor. Many individuals complain of aches and pains, rather than reporting feeling sad. Many report anger, blaming others, or are frustrated over minor situations.

Loss of interest or pleasure is nearly always present in every case. People may report feeling less interested in hobbies, "not caring anymore," or may socially withdraw. For example a avid golfer who no longer plays, or a child who loves football no longer goes to practice. In some people there is a loss of previous levels of interest of sexual desire.

Appetite is usually reduced, and one may feel that they have to force themselves to eat. Others may have a increased appetite and may crave specific foods such as sweets or carbohydrates. When these appetite changes are severe either way, there is a significant loss or gain in weight.

The most common sleep disturbance associated with depression is insomnia. People will complain of waking up in the middle of the night and having difficulty returning to sleep. Initial insomnia or difficulty falling asleep may also occur. A few individuals present with oversleeping or hypersomnia in the form of prolonged sleep episodes at night or increased daytime sleep. Sometimes the reason that the individual seeks help is for disturbed sleep.

Psychomotor changes include the inability to sit still, pacing, and hand wringing. Also, pulling or rubbing of the skin, clothing, or other objects, and slowed speech can occur. Other changes can be, increased thinking and body movements, increased pauses before answering, and speech that is decreased in volume, inflection, amount, variety of content, or muteness.

Decreased energy, tiredness, and fatigue are common. One may report fatigue without physical exertion. Even small tasks seem to require much effort. An individual may not be able to accomplish a task as well as they used to before. Getting up in the morning, showering and dressing may take twice as long, require twice as much effort, and cause exhaustion.

The sense of worthlessness or guilt associated with a depressive episode may include negative unrealistic evaluations of one's own worth or guilty preoccupations or ruminations over minor past failings. Such individuals often misinterpret neutral or trivial day to day events as evidence of personal defects and have an exaggerated sense of responsibility for untoward events. For example, a mother may become preoccupied with self-blame for the failure of an adult child who becomes involved in drugs or alcohol. Blaming oneself for being sick and for failing

to meet occupational or interpersonal responsibilities as a result of the depression is very common, and unless delusional, are not considered sufficient to meet the criteria (American Psychiatric Association 2000).

Many individuals report impaired ability to think, concentrate, or make a decision. They appear easily distracted or complain of memory loss. College students who are pursuing a career are often unable to function adequately even when they have a mild concentration problem. In students, a drop in grades may reflect poor concentration. When the depression is successfully treated, the memory problems often fully stop. College age students' depression is frequently associated with disruptive behavior disorders, eating disorders, attention deficit disorders, anxiety disorders, anxiety disorders, and substance related disorders. (Greist, 1997).

A factor that has been shown to influence the presentation of depression in a person is culture. Culture can influence the way a person communicates symptoms of depression. For example a person of Latino culture may complain of "nerves or headaches, and an Asian person may voice weakness, tiredness, or imbalance. In the middle eastern culture, one may state they are heartbroken. African Americans are less likely to acknowledge depressive symptoms or receive care for depression. Instead, they present with chronic pain, headaches, fatigue, sleep disturbances, sexual complaints, or bouts of diarrhea alternating with constipation. Such presentations combine features of depression, which may aid a diagnosis. (Peden, 2001).

Beck Depression Inventory

In this study, and in many research studies, the Beck Depression Inventory (BDI-II) has been used as the instrument for measuring the severity of depression

in adolescents age thirteen and older and in adults. The BDI-II builds on thirty-five years of accumulated psychometric data and clinical experience. The BDI-II is a twenty-one item self-reporting instrument for measuring depression levels, and was developed for the assessment of symptoms corresponding to criteria listed in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). The symptoms related to depression may include; sad mood, pessimism, past failure, loss of pleasure, guilty and punishment feelings, self dislike, self criticalness, suicidal thoughts or wishes, crying, agitation, loss of interest, indecisiveness, worthlessness, loss of energy, change in sleep patterns, irritability, changes in appetite, concentration difficulty, tiredness or fatigue, and loss of interest in sex. Each item is ranked 0-3, and summed with a range of 0-63; with higher scores indicating greater depression. Total scores range from 0-13 equals minimal depression, 14-19 is mild depression, 20-28 is moderate depression and 29- 63 is severe depression. The BDI II has been shown to be a valid and reliable measure of depression severity. A meta-analysis of the internal consistency of the BDI II estimates yielded a mean coefficient alpha of .86 for psychiatric patients , and a mean correlation of the BDI II and the Hamilton Rating Scale for Depression (HAM-D) of 0.73. in Beck's study (as sited in Blumenthal 1999). This is an appropriate instrument for the study.

Research Related to Effects of Exercise

Many studies have suggested exercise can help alleviate depression. Craft (1998) at Michigan State University researched the psychological mechanisms that might underlie this benefit. In a small group of nineteen women, nine women with

moderate depression underwent a nine week exercise program. Two days per week, the participants undertook moderate intensity 30 minute exercise on cycles and treadmills, and were taught stretching and how to monitor their heart rate. One day a week they exercised at home. They were gradually given control over their exercise. A control group of ten depressed women did not complete the exercise program. Both the control and the exercise participants were on antidepressant medications, for an average of 47 months. A self report assessment of depression symptoms (BDI-II) showed the exercise group's depression was significantly reduced both at three weeks after the program started, and at the program end. By contrast, the control group's depression symptoms remained unchanged.

Coping self-efficacy is defined as a person's belief that they can cope with their depression. Craft found that the exercise participants' coping self-efficacy was increased at three and nine weeks into the program, and that it correlated with their reduced depression symptoms, thus suggesting a possible mechanism for the exercise's beneficial effect. "Learning and mastering new health related skills may have given them the confidence necessary to master new techniques to deal with their symptoms", Craft said. The exercise participants stopped thinking about worries so much, and started concentrating on exercise (Craft 1998). This was a small study that can be used to support the use of an exercise intervention in depression, and the use of the BDI II for measurement, therefore this lends support to the study.

Blumenthal, et al (1999) examined whether physicians should prescribe exercise along with or instead of medication for major depression. In the study, one hundred and fifty-six women and men with major depressive disorder diagnosed by clinical

interview, BDI, and Hamilton Rating Scale for Depression (Ham-D) were selected for a sixteen week trial. The subjects were assigned randomly to a program of aerobic exercise (n =53), antidepressant medication (n=43), or combined exercise and antidepressant medication (n=55). The supervised aerobic exercise sessions involved a ten minute warm up followed by thirty minute walking or jogging at 70-80 percent of heart rate reserve. The workout ended with a five minute cool down.

Blumenthal's conclusion was exercise is as effective as an antidepressant medication in the treatment of depression. "An exercise training program may be considered an alternative to antidepressants for treatment of depression. Although antidepressants may facilitate a more rapid initial therapeutic response than exercise, after sixteen weeks of treatment, exercise was equally as effective in reducing depression among subjects with major depression disorder" (p. 2349). This is consistent with findings in other studies of exercise as a treatment method in young depressed adults (1999). This study used a longer treatment time period than is more commonly used in college settings, however it supports exercise as a treatment for depression.

In fourteen randomized controlled meta-analysis trials of exercise to help depression, Lawlor found twelve of the studies showed an independent, statistically and clinically significant improvement in depressive symptoms. Effect size: -1.1 (95% confidence interval -1.5 to -0.7). Lawlor concluded that existing randomized controlled trial evidence strongly suggests that physical activity can reduce depressive symptoms in sedentary depressed patients. She recommended writing a prescription for patients for exercise, and also suggests a pedometer for self monitoring and goal

setting (2001). This supports an exercise intervention also, for sedentary depressed college students in this study .

At Purdue University, psychologists found that middle aged professors who got a good deal of exercise were much less depressed than the most sedentary of their colleagues. The sedentary professors were put on a fitness program over four years. This actually did not lift their depression and led researchers to believe depression led to their inactivity, rather than the other way around. Thus, exercise may not do much for a person, who has been depressed for a long time, or someone who has an acute episode of severe depression. (Lobstein & Ismail, 2004).

However, exercise can help people with more moderate forms of depression. Psychiatrist J. Griest and his associates at the University of Wisconsin studied twenty- four clinic patients with moderate depression in an exercise program, and compared it to a group treated by psychotherapy. In the standard group, therapists met with patients once a week, and in the exercise group, patients went jogging with a trainer three times a week for forty to sixty minutes each day. After twelve weeks, about three quarters of the patients in each group had eliminated their depression. In one year they were re-evaluated, the people who had been treated with running therapy were still running on their own and were free of depression, while half of those in the psychotherapy group had returned to treatment (Greist 1997). Exercise has shown promise in the above studies as a treatment of depression.

Mechanism of Action of Exercise on Depression

There are multiple mechanisms of action of exercise on depression. During the stress response, approximately 1500 biochemical reactions occur in the body.

Neurotransmitters are activated, hormones are released, and nutrients are metabolized. Some body systems, like the cardiovascular system, accelerate their functions. The gastrointestinal system slows down their operations in response to stress. This is commonly referred to as the "fight or flight" response. The body is being prepared to expend physical energy, which in prehistoric times was necessary for survival. In modern times most human stress is psycho-social in nature, so the need to respond physically in most cases is unnecessary. Unfortunately, the by-products of the response continue to circulate in the body and have the potential to create physical illness. An example is cortisol secretion's impact on the immune system. Regular exercise is useful in removing the by products of the stress response, by providing the opportunity to stimulate the fighting or running dictated by the fight or flight phenomenon. As such, regular exercise allows the body to return to homeostasis faster and reduce the physical impact of psycho-social stress (Randolfi 2005). This explanation identifies why exercise may improve depression.

Artel suggests that exercise enhances a person's sense of mastery. This is important for both healthy and depressed people who feel a loss of control over their lives. He linked fifty-one studies to a small but significant increase in self esteem with exercise. Besides the physiological mechanisms why exercise improves depression, it also is known to work in the following ways.

Exercise reduces muscular tension: During stress, muscles contract and lose their stored energy. This allows muscle groups to return to their normal resting potential. This action also reduces further stress that is precipitated by pain and discomfort associated with muscular tension. Examples include, head aches or joint pain.

Stretching or yoga is also effective in reducing muscular tension (Artel 1999).

Jogging, skiing, and swimming, require a repetitive motion that can alter one's state of consciousness. This is described by some as moving meditation. The physiological effects of regular participation in these activities is similar to what happens when one practices meditation. Breathing and movement act as a part, and may be responsible for the feeling of calmness and tranquility calmed by some in response to exercise (Akandere, Tekin 2002).

Endorphin theories in exercise suggest catecholamine, including B Endorphins, can increase during physical activity of twenty minutes or more. Chemically similar to opiate compounds, this morphine like substance has been proven to provide an analgesic (pain relieving) effect and promote a sense of euphoria. The mechanism of the "second wind" or "runner's high", and the effect of these chemical compounds in the brain are not fully understood. The controversy in this area has to do with the inability to measure chemical changes that occur on the other side of the blood-brain barrier. The increases the brain serotonin associated with frequent exercise are so significant, that some have suggested that this is a more effective treatment for clinical depression than either psychotherapy, or the use of anti depression drugs. (Chaouloff, 1999).

Another reason that exercise may improve depression, is that physical activity may be an outlet for anger and hostility: Used properly, exercise provides a socially acceptable means of physically releasing negative energy in a healthy way

Another benefit of exercise training is that, competition teaches one a great deal about life, and what is necessary for success through one's participation. Knowing

what it takes to win, how to accept loss, how to set goals, how to deal with levels of stress, and how to get along with others are all mentioned as lessons learned through involvement in sports (Akandere and Tekin 2006).

Other Effects of Exercise and Barriers

Very few studies refute the benefits of exercise in the treatment of depression. Several studies have found there are negative consequences and contradictions to exercise therapy. One such consequence is an addiction to exercise. Although exercise is considered to be a positive addiction, the withdrawal effects of not being able to exercise can create problems. This is thought to be from changes in catecholamine levels. These individuals should be aware of possible increase in hostility, anxiety, irritability and depression associated with not being able to work out. This often happens in sports injuries, when persons cannot continue exercise (Pollock 2001).

Compulsive training, like any activity, can have its downside. Overuse of any coping strategy can create additional problems. For some, physical activity can be escape from taking responsibility for ones actions. By indulging themselves in their activity, they avoid troubling life situations which are difficult to resolve (Salmon 2000).

There are several barriers to exercise initiation and compliance in the treatment of depression. There is little question that the majority of subjects encounter some difficulty in making healthy lifestyle changes, whether for physical or mental health reasons. With respect to exercise compliance, fifty percent of people who begin a program drop out within six months. That percentage is probably much higher for

depressed patients. (Pollock 2001).

Richardson (2003) states "it's hard to start a exercise program and harder to stick with It." She questioned how many depressed patients successfully initiate and maintain a medication let alone an exercise program. She goes on to state, "twenty to sixty percent stop taking medication in the first week of therapy." (p.345-346).

Other barriers identified in the article included: educational barriers (such as the subject not understanding exactly why the proposed change will help); physician barriers (traditional medical model thinking that does not empower the subject); co-morbid conditions that may inhibit change (such as a body dimorphic disorder, which may prevent a person from exercising in front of others); poor timing (such as attempting to start an exercise program during a time of high family stress); psychological barriers (such as fear of weight loss being associated with greater interpersonal vulnerability); social barriers (such as lack of economic resources); and finally, systemic barriers (such as spousal opposition to the patient's spending time on exercise away from home).

For the subject a relapse from exercise usually is experienced as failure, and it frequently is accompanied by feelings of shame. Exercise relapse is different from others kinds of relapse in that usually it is "invisible" and does not attract much attention. (Pollock 2001).

Artel, in his studies, lists other barriers to exercise. He felt that common symptoms of depression; fatigue, lack of energy, and psychomotor retardation may pose a problem to physical activity. Feeling of hopelessness and worthlessness may also interfere with motivation to do exercise. Many depressed patients in his study had a tendency to self-blame and see exercise as another occasion for failure (1999).

As in Artel's study, this study found that the subjects with depression lacked energy, motivation to exercise, or fill out the log forms correctly. Many subjects dropped out or did not complete the study.

Summary

In this chapter, the current literature related to exercise and depression was reviewed. The majority of studies found exercise as an positive alternative or complementary treatment for depression. Very few found negative aspects to using exercise in treatment of depression.

Most research studies related to exercise and depression have been plagued by methodological problems. These included, limited sample sizes, lack of randomized designs, uncontrolled concurrent therapies, and failure to document exercise training effects. Other problems were, imprecise diagnosis of depression, brief treatment periods, lack of motivation of subjects, and lack of a standardized exercise regimen.

Overall, the literature supports the use of exercise as a possible treatment or adjunct to conventional treatment for depression. The effects of exercise on subjects show a number of psychological benefits, including improvements in cognitive function, mood, and sense of well-being. This supports the hypotheses of the current study, that the group of University of Michigan-Flint (UMF) students with the traditional cognitive therapy and exercise will have higher net positive scores, or greater change in the post Beck Depression Inventory, when compared to the other two groups of cognitive therapy alone, and cognitive therapy with a health promotion flyer.

Research Questions

After consideration of the information presented in the literature, and with most

practitioners using standard exercise as a positive adjunct for the treatment of depression, several questions concerning exercise and depression are important to examine. First, can exercise positively affect depression in college students? Second, in the (UMF) college student population, will there be a greater net positive change in between the pre and post scores on the Beck Depression scale of those who exercise? Third, how will the post Beck scores differ between the three groups of cognitive therapy alone, cognitive therapy with exercise, and cognitive therapy with health flyer called (Food for the Mood and Vitamins for Depression)? Fourth, how do the demographics of sex, age, ethnicity, marital, and education affect rates of depression in the (UMF) college student population? Lastly, how will the scores differ between the three groups on loss of energy on the post BDI-II questionnaire.

Definition of Terms

For the purposes of this study the following terms were operationally defined as follows:

Depression - A mood disorder characterized by depressed mood, feelings of sadness or emptiness, diminished interest or pleasure in activities, significant changes in appetite (both increases and decreases), insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, diminished ability to think, concentrate or make decisions, recurrent thought of death or suicide.

DSM–IV – The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, developed and published by the American Psychiatric Association which defines and describes mental disorders and conditions in a clinically descriptive fashion.

Beck Depression Inventory (BDI) - An instrument designed by Aaron Beck utilized in research, screening and treatment of depression. The instrument is a 21 item subjective self rating related to the symptoms of depression. The instrument is used to differentiate between the normal and the depressed populations. The instrument is also used to discriminate the level of depression within the depressed population.

Cognitive therapy – Therapy performed by the clinician that helps the client improve with their awareness of life circumstances, perception, reasoning, intuition, and memory that lead to episodes of depression.

Analysis of variance (ANOVA) – Statistical test which is used to test mean differences among three or more groups by comparing variability between groups to variability with in groups.

Quantitative analysis – The manipulation of numeric data through statistical procedures for the purpose of describing a phenomena or assessing the magnitude and reliability of a relationship among them.

Random assignment – The assignment of subjects to treatment conditions in a random manner. (Drawing a group number from a bowl assigning them to one of three groups).

Health promotion – use a wellness orientation to focus on health promoting behaviors. Health promotion entails activities directed toward developing resources that maintain or enhance a person's well being.

Chapter IV

Methodology

Introduction

In this chapter the methodology will be discussed. This will include the population, sample, procedures, techniques, and reliability and validity of instrument.

Population

Sampling design is a complex and critical part of the design of quantitative research. In this study, on the effects of exercise on college student's depression, the population was students attending the University of Michigan-Flint who presented to the student center for evaluation and treatment of depression. The target sub-population included the clients who came into the clinic with depression, and were seeking cognitive therapy from the campus counselor.

Sample

The subjects were a convenience sample of students who were randomly assigned to one of the three groups for treatment. The campus counselor determined if they met the eligibility criteria, in part by administering the Beck Depression Inventory (BDI). The BDI baseline tool was used to measure the level of depression in the subjects. The criteria also included: a) not being suicidal as indicated by the BDI rating on question 9; b) no prior treatment for major psychiatric illness; c) not currently in an exercise program, and d) age 18 – 45 years of age.

The subjects were randomly assigned to a group by drawing a folded piece of paper from a bowl. It contained an equal number of folded papers with a "C" for the control group of cognitive therapy only, a "T" for treatment group of cognitive therapy plus

exercise, and a third group "F", who participated in cognitive therapy, and received a health flyer "Food for the Mood" (Appendix A), and teaching on vitamins that help ward off depression. There were three groups with 8 subjects in the (cognitive group 1), 9 subjects in (exercise and cognitive group 2), and 7 in (cognitive therapy and health flyer group 3) the total equaled 24 subjects who entered the study.

Procedures and Techniques

Potential subjects were first approached by the clinic's receptionist. Each subject was given an invitational letter explaining the study (Appendix B). If the subject was interested; the clinic intern obtained consent (Appendix C). A letter of introduction explaining the procedures was also given to the participant (Appendix D). A confidential log was be used to keep tract of subject's names and the assigned code numbers. All data collected included only code numbers to comply with privacy regulations. Other data next to their code number included the date entered into the study, appointment dates, beginning BDI score, steps logged per pedometer per week, ending BDI score, and number of sessions attended. The log was kept confidential in the locked office in a locked file cabinet.

Random assignment to a group was done as mentioned above. All groups were given a demographic data form (Appendix E) and the Beck Depression Inventory (Appendix F). It is a 21 item self- report questionnaire consisting of symptoms and attitudes relating to depression. The instrument includes items such as sadness, pessimism, past failure, loss of pleasure, guilty feelings, self-dislike suicidal thoughts, crying, loss of interest, loss of energy, appetite, tiredness, fatigue or loss of interest in sex. The questions are closed ended. This means that the subject is asked to select from a given range of four response

choices. The subjects were instructed to circle the one answer that best described them. Response choices have values attached to them varying from 0 to 3. Individual response item values are cumulated for a total BDI- II score.

The BDI-II score can be interpreted by:

- 1-10 = These ups and downs are considered normal.
- 11-16 = Mild mood disturbance.
- 17-20 = Borderline clinical depression
- 21-30 = Moderate depression.
- 31-40 = Severe depression.
- Over 40 = Extreme depression.
- A persistent score of 17 or above indicates you may need professional treatment because of depressive signs or symptoms.

The BDI II was evaluated by the clinic's counselor. Once evaluated, a letter of introduction was given to each subject as indicated (Appendix E). Each subject was given a pedometer and instructed on its use, and the goal of walking 10,000 steps per day. On their last session, the subjects received a letter of appreciation and were allowed to keep the pedometers for future use.

Throughout the study, the clinic's counselor or the interns entered the data into the log form for analysis by the investigator. The timing of the data collection was during the Fall 2004 and Winter 2005 semesters.

Reliability and Validity of the Instrument

Validity refers to the degree to which an instrument measures what it is supposed to be measuring (Polit & Beck 2004). The assessment of the validity of an instrument can

be done with aspects of content validity, criterion-related validity, and construct validity. According to Polit and Beck, criterion-related validity involves a practical approach to validity assessment. This assessment involves establishing the relationship between the instrument and some other criterion.

In looking at the validity of the BDI the author Beck States, "the readily apparent face validity of the BDI must be addressed. The BDI appears as though it is assessing depression. This may be quite advantageous; it may make it easy for a subject to distort the results of the test. Content validity would seem to be quite high since the BDI appears to evaluate a wide variety of symptoms and attitudes associated with depression. One study addressed the concurrent validity demonstrated a correlation of .77 between the inventory and psychiatric rating using university students as subjects." Beck also reports similar studies in which coefficients of .65 and .67 were obtained in comparing results of the BDI with psychiatric ratings of patients (Beck, 2004, Validity section para. 1).

In this study, the Beck Depression Inventory was used to measure the presence of depression, and the score indicated the intensity of the depressive episode. According to Beck, the reliability test-retest has been studied in the case of 38 patients who were given the BDI on two occasions. He discovered that the changes in BDI score tended to parallel changes in the clinical reading of the depth of depression. This indicates a consistent relationship between BDI scores and the patient's clinical state. The reliability statistics were reported as above .90 for internal consistency. Studies demonstrated a correlation coefficient of .86 for the test items. The Spearman-Brown correlation for the reliability of the BDI yielded a coefficient of .93 (Beck retrieved 6/09/04). Reliability coefficient for

internal consistency was reported for this study. For the purpose of the current study, the pre and post Beck scores were used to rate the change in depression levels of the subjects, and how exercise affected these scores.

Chapter V

Results

Once permission had been obtained from the UM-Flint Internal Review Board, 24 subjects who presented to the U of M Flint student center for depression, were recruited between Fall 2004 and Spring 2005. Individual data collection tools during the course of the study were; a descriptive demographic questionnaire, a pre and post Beck Depression Inventory, a pedometer log form, and a pedometer to log their steps. The demographic data collection form was given to determine the characteristics of the population. Demographic characteristic for the total sample of 24 subjects is shown in Table 1 and Figures 1-2. Categorical frequencies were changed to percents.

Table 1

Demographic Characteristic of UMF Study Population

Characteristics	N	Percent
Ethnicity		
Caucasian	23	96 %
Hispanic	1	4 %
Gender		
Female	13	54 %
Male	11	46 %
Marital Status		
Single	17	71%
Separated	2	8 %
Married	5	21%
Recurrent Depression		
No	10	42%
Yes	14	58%
Education		
Freshman	2	8%
Sophomore	6	25%
Junior	7	29%
Senior	8	33%
Graduate	1	4%

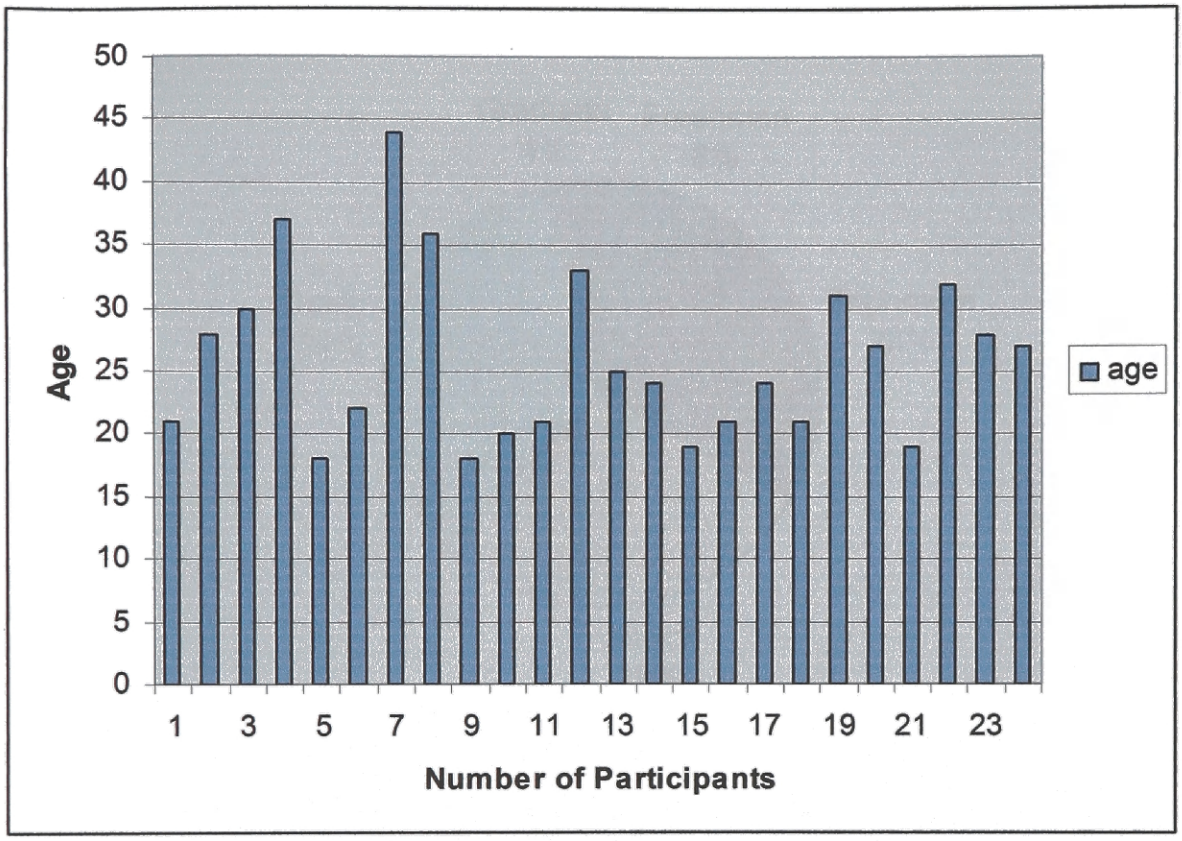

Figure 1. Age of Participants

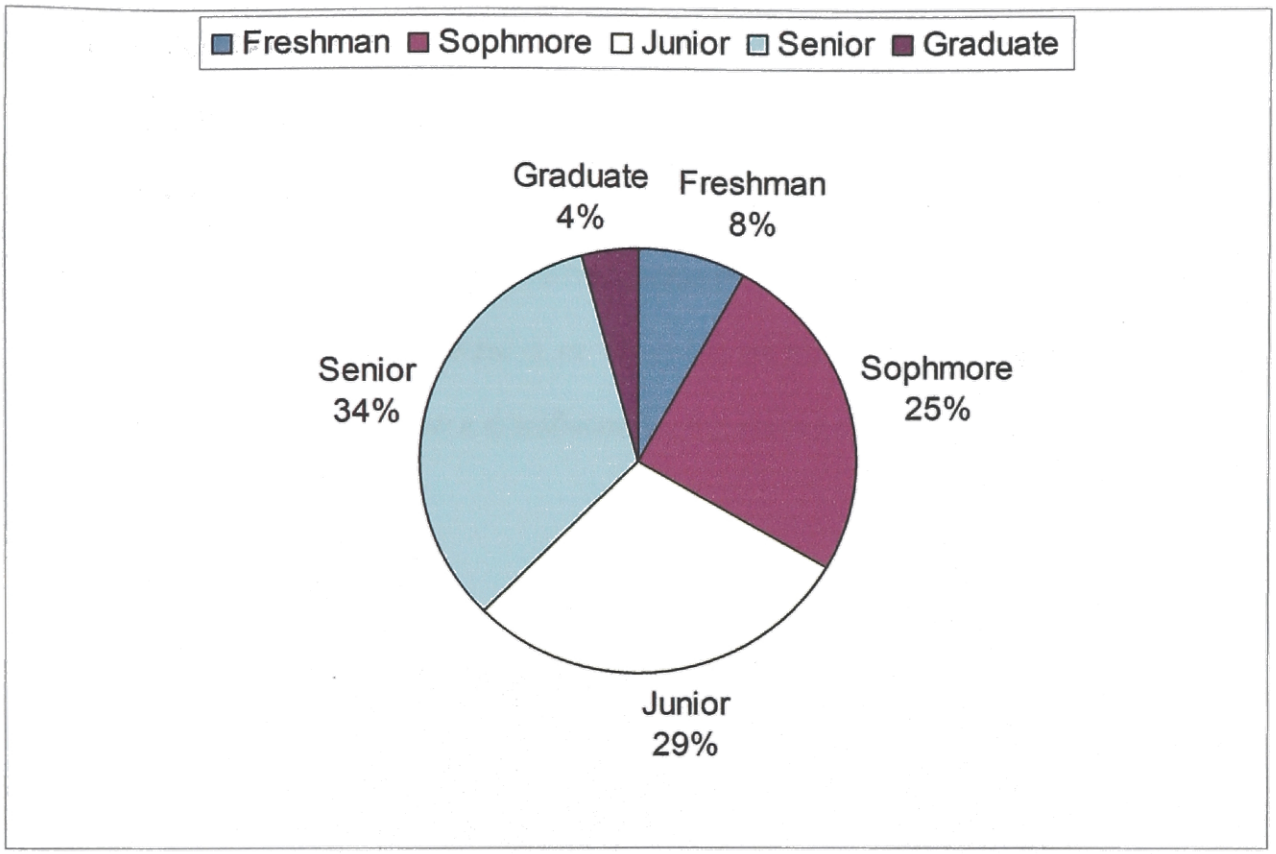

Figure 2. Educational Status

A pre and post Beck Depression Inventory (BDI II) was given. After 8 weeks of treatment, the three groups were compared by Pre and Post Beck summary scores. (See Table 2). Post Beck (BDI-II) scores were analyzed by a statistical consultant, using SPSS to run the One Way ANOVA to compare the effectiveness of different interventions. The analysis included the exercise group to test the hypothesis: the exercise group will have higher net positive scores or greater change in the post scores than the control group(cognitive only), or the cognitive plus health flyer group. The post scores in the table did not show a significant finding among the three groups as shown in Table 3.

Table 2

Participant Pre/ Post Summary Comparison Scores

Group		Pre-Beck	Post-Beck
Group 1 Cognitive Only	Mean	24.22	13.00
	n	9	5
	Std. Deviation	11.893	5.788
Group 2 Cognitive and Exercise	Mean	20.38	8.00
	n	8	4
	Std. Deviation	7.633	5.228
Group 3 Cognitive and Health Flyer	Mean	26.57	13.00
	n	7	7
	Std. Deviation	11.998	11.460
Total	Mean	23.63	11.75
	n	24	16
	Std. Deviation	10.533	8.481

Table 3

Differences in Mean Scores on Pre and Post Beck

	Pre/Post Beck-Total Score			Pre/Post Item-Loss of Energy		
Study Group	n	Mean	Std. Err.	n	Mean	Std. Err.
Group 1 Cognitive only	5	10.0000	1.78885	5	.6000	.40000
Group 2 Cognitive and Exercise	4	14.7500	4.26956	5	1.0000	.44721
Group 3 Cognitive and Health Flyer	7	13.5714	5.68983	5	.4000	.87178

Note. Beck total score: F= .232, p=.796; Loss of energy: F= .250 p =.783
Note. Numbers in groups are not equal due to missing data

Chapter VI

Discussion

Traditional treatment for depression in college students is cognitive therapy and antidepressant medication. Previous observational and interventional studies, as stated in the literature review, have suggested that regular physical exercise may be associated with reduced symptoms of depression. The Health Promotion Model is widely represented in the nursing literature and is the underpinning framework for over 100 research studies. However, the question arises, as to the universality of the model for explaining health promoting behavior among different age groups, namely, college students. In examining the literature, little work has been done to apply the HPM in relation to college students, exercise, and depression. In this study, the HPM is supported by the subjects who presented themselves for depression and entered into the research study. Those who were selected underwent behavioral counseling interventions, diet education, and exercise instruction to help them adopt a change in behavior. These actions were theorized to affect health outcomes and mental health status.

Behavior change models such as the HPM explain the biological, cognitive, behavioral, and psychosocial environmental determinants of health related behaviors. Thus, they also define interventions to produce changes in knowledge, attitudes, motivations, self-confidence, skills, and social supports required for behavior change and maintenance. The application of the HPM to behavioral counseling and interventions is an important contribution to strengthening health research in this study.

The purpose of this study was to see if exercise can positively affect depression in (UMF) college students. Also, to answer the question will there be a greater net positive

change between the pre and post scores on the BDI-II scale of the three groups, cognitive therapy only, cognitive therapy and exercise, and cognitive therapy, and health flyer (Food for the Mood and Vitamins for Depression)? Finally, to determine if energy levels of those who exercise are significantly higher than those in the cognitive therapy only group on the post BDI-II.

The results of this study should be used cautiously due to its limitations, but are consistent with other studies. Twenty four subjects met the study criteria and were randomized into the study. The primary reasons for patient exclusion were a failure to meet the BDI-II criteria scores, or were suicidal as indicated on question 9 in the BDI-II questionnaire . Nine subjects were assigned to the (cognitive therapy only) group 1. Eight were assigned to the (cognitive therapy plus exercise group), and 7 were assigned to the (cognitive therapy plus health flyer group). The groups did not differ with respect to age, sex, level of education, marital status, ethnic composition, or history of recurrent depression. Out of the group of 24 subjects 33% (n=8) dropped out before completing the entire 8 week session. Leaving 31% (n=5) in the (cognitive group 1), 25% (n=4) in the (exercise group 2), 43% (n=7) in the (cognitive plus health flyer group). In the 8 week study, only 56% (n=9) attended all 8 appointments. Only 25 % (n=4) completed the amount of steps required per day to be counted in the exercise group. Subjects were removed from the study when they did not show up for all sessions, or did not complete the second BDI-II questioner. Three subjects in the cognitive group were prescribed antidepressants during the study and two had life events. No one in the exercise group needed antidepressants or had life events. One person in the exercise group experienced pedometer problems and was given a new one.

The pre and post BDI-II mean scores after 8 weeks, showed depression decreased in all three groups. The mean scores in group 1(the cognitive group) decreased from 24 to 13. In group 2, (the exercise plus cognitive therapy), subjects mean scores decrease from 20 to 8, and in the cognitive therapy plus health flyer group, the mean depression scores went from 26 to 13. The exercise groups mean scores were slightly more decreased than the other two groups, but not enough to make a statistical difference due to the three groups small sample size ($p = .041$). Energy levels in all three study groups increased, but not significantly due to limitations previously stated in this study. The energy levels noted in the exercise group were higher than the other two groups. According to Polit (2004), power analysis builds on the concept of the effect size, which in turn expresses the strength of relationships among research variables. If there is reason to expect that the independent and dependent variables will be strongly related, then a relatively small sample should be adequate to demonstrate the relationship statistically. Interventions have modest effects, and variables are usually only moderately correlated with one another. When there is no reason for believing that relationships will be strong and then small samples are risky. Limiting the research hypothesis of the subgroup with the traditional cognitive therapy and exercise to have higher net positive score, or greater change in the post BDI-II scores compared to the other subgroups, according to Polit, the samples must be large enough to support theses divisions of the sample. In this study, the sample was too small to divide into three subgroups due to subject loss over the 8 week period.

Limitations

Many limitations were significant to this study including the small sample

size that prevented statistical correlation, the ethnic makeup (96% Caucasian) of the population, the short 8 week session, high drop out rates, and the difficulty of getting depressed subjects to exercise or fill out the exercise logs in this study. Future studies should attempt to obtain a larger sample of the population, run the intervention session at least 16 weeks, and have a more structured exercise program.

Implications

The results of this study, although limited are congruent with other studies, and suggest that exercise can be used to further assist in the treatment of college students and other patients with depression. Nurse practitioners must learn to search the research literature, evaluate, and implement relevant findings. Nurse practitioners, as well as Physicians, need to question their current practices and find better alternatives to improve patient outcomes. With depression affecting 10% of college students, and out patient primary care patients, the exercise and health promotion ideas of diet and vitamins in "Food for the Mood" could be prescribed in clinical practice. According to the President's Advisory Commission of Consumer Protection and Quality in the Health care Industry (1998) "improving the quality of health care requires a commitment to delivering health care based on sound scientific evidence and innovating new, effective health care practices and preventive approaches." (p. 169). Research includes integrating the concepts of evidence-base decision-making, utilization, and dissemination (Dobbins et al., 2002).

"Evidence-based practice is the integration of individual clinical expertise with the best available external clinical evidence from research" (Sackett, Rosenberg, Gray,

Haynes, & Richardson, 1996). "Evidence-based practice is more likely to occur in practice settings that value the use of new knowledge and provide resources to access that knowledge" (Rosswurm & Larrabee, 1999 p. 317). The idea for this research came from disseminated information that not enough was being done to improve or decrease depression in college students and in primary care settings.

Nurse practitioners using the DSM IV and the Beck Depression Inventory (BDI II) can increase the confidence of a diagnosis of depression. The BDI-II was used on this study, and further supports this as a method of treating depression in college students. However, self reporting, as in the BDI-II, can result in response biases Polit (2002). Examples include, a tendency of some individuals to present themselves favorably and giving answers that are congruent with social values. These biases are most common in composite scales scores due to "yea" or "nay" sayers who agree or disagree with statements in question content. It is important for researchers who use self-reports to give these issues some thought. (pg. 359).

This study was restricted by having one primary psychology intern who collected and obtained all data information. This limited the research by confining the amount of time and resources available to one person during a given semester. Additional researchers would decrease the biases that exist with only one researcher. Additional researchers would allow for a larger and more extensive study with possible generalization to a larger population. Further research is needed to validate the findings of this study. The application of larger more diverse population and a more structured exercise program are also recommended.

Summary

Behavioral counseling interventions in clinical primary care settings are an important means of addressing prevalent health-related behaviors, such as lack of physical activity, poor diet, substance abuse and dependence, or risky sexual behavior that underlie a substantial proportion of depression in college students at universities all over the United States. Despite the limitations of this study, the post BDI-II scores of participants did show improvement in depression. In the literature review, research studies did show a significant finding that exercise and diet are beneficial in the treatment of depression. Based on the literature review and limited result in this study, a structured exercise training program with a pedometer to log steps should be considered for an alternative to antidepressants for treatment of depression in college students. In further research, a longer study period should be used. Further study is needed to determine the exact mechanisms involved that affect depression.

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Appendix A

Food For the Mood and Vitamins for Depression

"When it comes to healing depression, individual nutrients are part of the story. Some experts feel that what you're eating and drinking also plays an important role". Here are some tips from Dr. Christensen, PhD., of Psychology.

Cut back on sugar. Sweets temporarily boost your mood, but the lift doesn't last. Some people notice a rebound effect and feel a little tired an hour or more after eating sweets. This slump is more pronounced in people who are depressed to begin with. To find out if sugar is a contributing factor to your depression, cut out sweets and added sugars for a few weeks. Artificial sweeteners are okay.

If the thought of never having another Oreo contributes to your depression, take heart. While a minority of people are so sensitive to sugar that they shouldn't have it at all, others can handle a little bit. Gradually reintroduce sweet to your diet to find out how much you can tolerate.

Avoid the caffeine crash. Studies show that depressed people who depend on caffeine to get them through the day may be setting themselves up for a fall. Try and eliminate coffee. Tea, cola, and chocolate as well as pain relievers contain caffeine. Depressed people who are sensitive to caffeine generally notice improvement after about four days without caffeine. If you do find that you are sensitive to caffeine, it usually isn't an all or nothing proposition. Some people can tolerate a cup of tea a day, but others not more than that. People need to experiment to find their own limits.

Go low-fat. Research suggests that besides improving your overall health, a low-fat diet may help stabilize your mood. Cutting out fat from your diet isn't complicated. Avoid fried foods, switch to leaner cuts of meat, and remove the skin from poultry. Swap whole milk for 1 percent or skim, and choose low-fat or nonfat cheeses and yogurt. Make an effort to eat more fruits, vegetables and whole-grain cereals. This diet not only will lower your cholesterol, but actually shows less depression and hostility after adopting the leaner diet.

The B-complex Vitamins help fight depression. The B-complex vitamins are essential to mental and emotional well being. They cannot be stored in out bodies, so we depend entirely on our daily diets to supply them. B vitamins are destroyed by alcohol, refined sugars, nicotine, and caffeine so it is no surprise that many people may be deficient in these. Clinical signs of insufficient vitamin B complex are mood changes, insomnia, and change in appetite, sugar cravings and impaired drug metabolism. To make sure your body is getting the nutrients it needs to combat depression take a multivitamin daily with folic acid, riboflavin, thiamin and Vitamin B6. Vitamin C and Selenium are also helpful. Source: Feinstein, A., (1996). Prevention's Healing with Vitamins the Most Effective Vitamin and Mineral Treatments for Everyday Health Problems and Serious Disease. Rodale Press, Pennsylvania http://www.wvda.org/index.html

APPENDIX B

INVITATIONAL LETTER

Date: September 1, 2004

Dear Fellow University of Michigan College Students,

I would like to invite you to participate in a study conducted by Arlene McKinney RN, BSN, and a graduate student in the Family Nurse Practitioner program at the University of Michigan Flint. This research is about the effects of exercise on depression in college student's right here on our own campus. The sample will include students who are age 18 to 40, who suffer from depression. The entire study will be conducted at the University of Michigan Flint Campus Student Development Center.

If you choose to participate in this study you will be asked to fill out the Beck Depression Inventory, and a short demographical data questionnaire. This will only take 20 minutes. Then you will meet with the counselor. You will be asked to draw a paper out of a bowl that will place you in either one of two groups. Both groups will receive cognitive therapy once a week with the clinic's counselor and one group will in addition receive a pedometer, and be requested to walk for 30 minutes 3 times per week. There will be a pedometer log for you to fill out and bring to each session. The sessions will be one hour once a week for 8 weeks. At the end of the 8 weeks you will be asked to retake the Beck Depression Inventory. This should only take 15 minutes of your time.

Any information you provide will be kept confidential. Neither your name nor any other identifying information will appear on any of the materials used in study. All results will be analyzed as group data and no individuals will ever be identified. You may keep your pedometer at the end of this study, so you can keep walking and stay healthy.

Let the Clinic's Nurse Practitioner or the counselor know when you visit the clinic that you would like to participate.

Sincerely,

Arlene McKinney RN, BSN.
Beeper 248-407-6258
Office 248-338 5138

APPENDIX C

Consent Form

I agree to participate in the study entitled the Effects of Exercise on Depression in College students conducted by Arlene M. McKinney RN BSN. I am currently a student at the University of Michigan. I understand the purpose of this study is to learn more about human needs and how to cope with depression. I understand a benefit from this study is that the findings may contribute to the strategies that other Health Professionals can use to help other individuals cope.

I am aware that my participation in this study will take 1 hour in cognitive therapy per week. I agree to fill out the Beck Depression Inventory, and the demographical data form. If I am placed in the cognitive plus exercise group I will walk 30 minutes three times a week and log my steps on my pedometer log form. I understand that sessions last for eight weeks and I will bring my log form to the weekly sessions for data collection. At the end of eight weeks I will fill out the Beck Depression Inventory.

I understand that any information I provide will be kept confidential. Neither my name nor any other personal identifying information will appear on any of the materials
Used in this study. I understand that I will be assigned a code number for all identification purposes and that all results will be analyzed as group data.

I also understand that there are no foreseeable risks or discomforts to me by participating in this study. I understand that my participation is voluntary and that I can withdraw from the study anytime before the end of the data collection interval for all subjects by either paging Arlene McKinney at 248-407-6258 between the hours of 9 A.M. to 9 P.M. or leaving a voice mail at 248 338-5138. There are no penalties for withdrawing from the study and I understand that I can still receive the cognitive therapy from the psychologist and not be in the study.

Signature: _____ Date: _____

APPENDIX D Code_____

LETTER OF INTRODUCTION

Hi my name is Arlene McKinney. I am a graduate student at U of M Flint, who is working in the Family Nurse Practitioner Program. I am interested in studying how exercise affects depression in college age students.

The study will be conducted in the following way. First you will be seen by the Clinic's Councilor. He will administer the Beck Depression Scale. This will take about Fifteen minutes to complete. There also will be a short demographic form that will only take a few minutes to complete. This will include age, race, sex, level of education, marital status, and history of recurrent depression. Secondly, you will select a piece of paper out of a bowl that randomly will assign you to one of two groups. Both groups will receive standard care, with a one hour session once a week with the Clinic's Councilor. The experimental group will get a pedometer with a self explanation on how to use it and a log form. This group will need to walk three times per week for a period of thirty minutes and log your steps in the log schedule. This form will be brought to your session each week and shown to the Councilor. For both groups, the sessions will be for eight weeks. At the end of eight weeks you will be asked to retake the Beck Depression Scale.

During this study, the privacy of the participants will be protected by the professional staff at the clinic. If you have any questions about the study feel free to beep Arlene McKinney (248)-407-6258.

Appendix E

Check or write in one answer for each question below.

1. Age: _____(Yrs)

2. Race: _____ (Circle all that apply).

A). American Indian or Alaska Native
B). Asian or Pacific Islander
C). African American
D). Caucasian
E). Hispanic or Latino
F). Other

3. Sex: ___Male or Female ___ (Please Circle one).

4. Marital Status: Single _____ Divorced _____ Separated _____

Single living with another _____ Widowed _____ Married _____

5. Educational Status:

Freshman _____ Sophomore _____ Junior _____

Senior _____ Graduate _____ PhD _____

6. History of recurrent depression. Yes _____ No _____(Please circle one).

Appendix F

Beck Depression Inventory-BDI II Original Form.

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying

0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

_____ Subtotal Page 1

11. Agitation

0 I am no more restless or wound up than usual.

1 I feel more restless or wound up than usual.

2 I am so restless or agitated that it's hard to stay still.

3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.

1 I am less interested in other people or things than before.

2 I have lost most of my interest in other people or things.

3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.

1 I find it more difficult to make decisions than usual.

2 I have much greater difficulty in making decisions than I used to.

3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.

1 I don't consider myself as worthwhile and useful as I used to.

2 I feel more worthless as compared to other people.

3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.

1 I have less energy than I used to have.

2 I don't have enough energy to do very much.

3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.

1a I sleep somewhat more than usual.

1b I sleep somewhat less than usual.

2a I sleep a lot more than usual.

2b I sleep a lot less than usual.

3a I sleep most of the day.

3b I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.

1 I am more irritable than usual.

2 I am much more irritable than usual.

3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.

1a My appetite is somewhat less than usual.

1b My appetite is somewhat greater than usual.

2a My appetite is much less than before.

2b My appetite is much greater than usual.

3a I have no appetite at all.

3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.

1 I can't concentrate as well as usual.

2 It's hard to keep my mind on anything for very long.

3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.

1 I get more tired or fatigued more easily than usual.

2 I am too tired or fatigued to do a lot of the things I used to do.

3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.

1 I am less interested in sex than I used to be.

2 I am much less interested in sex now.

3 I have lost interest in sex completely.

8 9 10 11 12 A B C D E

NOTICE: This form is printed with both blue and black ink. If your copy does not appear this way it has been photocopied in

_____ Subtotal Page 2

_____ Subtotal Page 1

Appendix G
Institutional Review Board Approval

UNIVERSITY OF MICHIGAN – FLINT
Human Subjects Review

September 13, 2004

To: Connie Creech

From: Marianne McGrath, Chair, Human Subjects Committee

Re: The Effects of Exercise on Depression in College Students (Approval ##**05/04**)

This is to inform you that your survey instruments for "The Effects of Exercise on Depression in College Students" has been approved by the Human Subjects Committee. Please take note that your use of human subjects is approved, only as detailed in your approved application. Should you wish to make any changes in the use of human subjects which differ from the approved proposal, you must inform this committee prior to making these changes. If you are seeking funding for this proposal, it is your responsibility to ensure that your proposed use of human subjects in your funding application is consistent with that approved by this memo.

This approval for your project is valid for a period of twelve months. If your project extends beyond this period (twelve months), please re-submit your proposal for consideration.